Goniophotometry Report

1_PHOT_NINETY-NINE-1650lmChip-2700K-WallWash_2309
www.factorylux.com

Tested Light Source - 1_PHOT_NINETY-NINE-1650lmChip-2700K-WallWash_2309

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

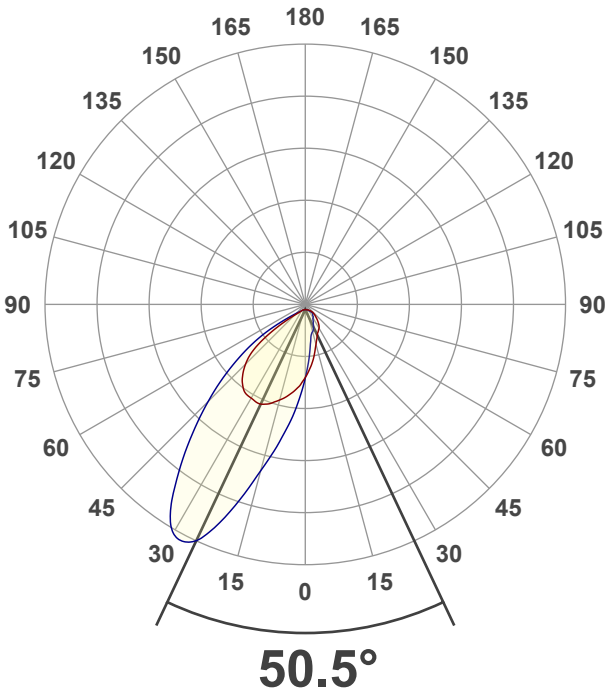
Measurement Conditions

Number of C-planes and Resolution	24 planes – 15°
γ (gamma)-Resolution	1.5°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	13.3 W – PF 0.98 – DPF 0.99
Input RMS Voltage and Current	239 V – 0.056 A
Frequency of Input Power	49.9 Hz

Main Light Measurement Results

Output	1152 lm
Efficiency	87 lm/W
Peak Intensity and Beam Angle	1240 cd – 50.5°
Color Rendering Index	CRI 92.1

Light Intensity Distribution



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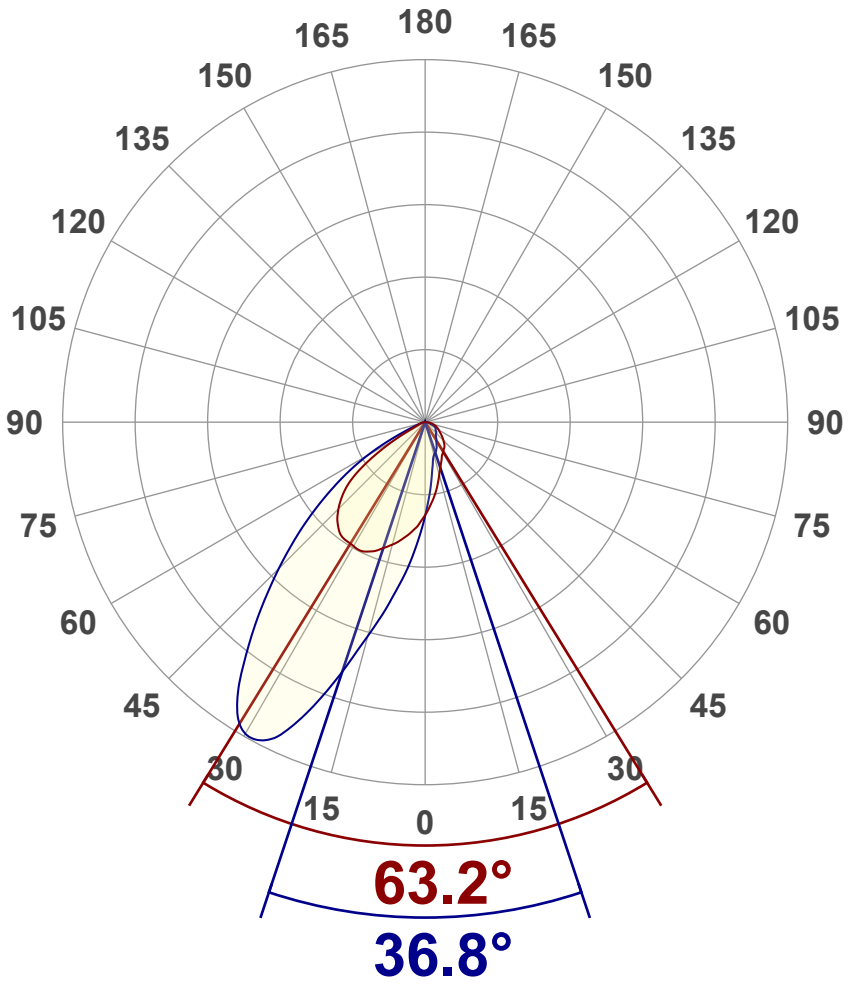
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1152 lm
Peak Intensity	1240 cd
Beam Angle (50%)	50.5°
Beam Angle (90%)	36.8°
Beam Angle (10%)	79.9°

Cut-off Angle

Average 2,5%	149.3°

Field Angle

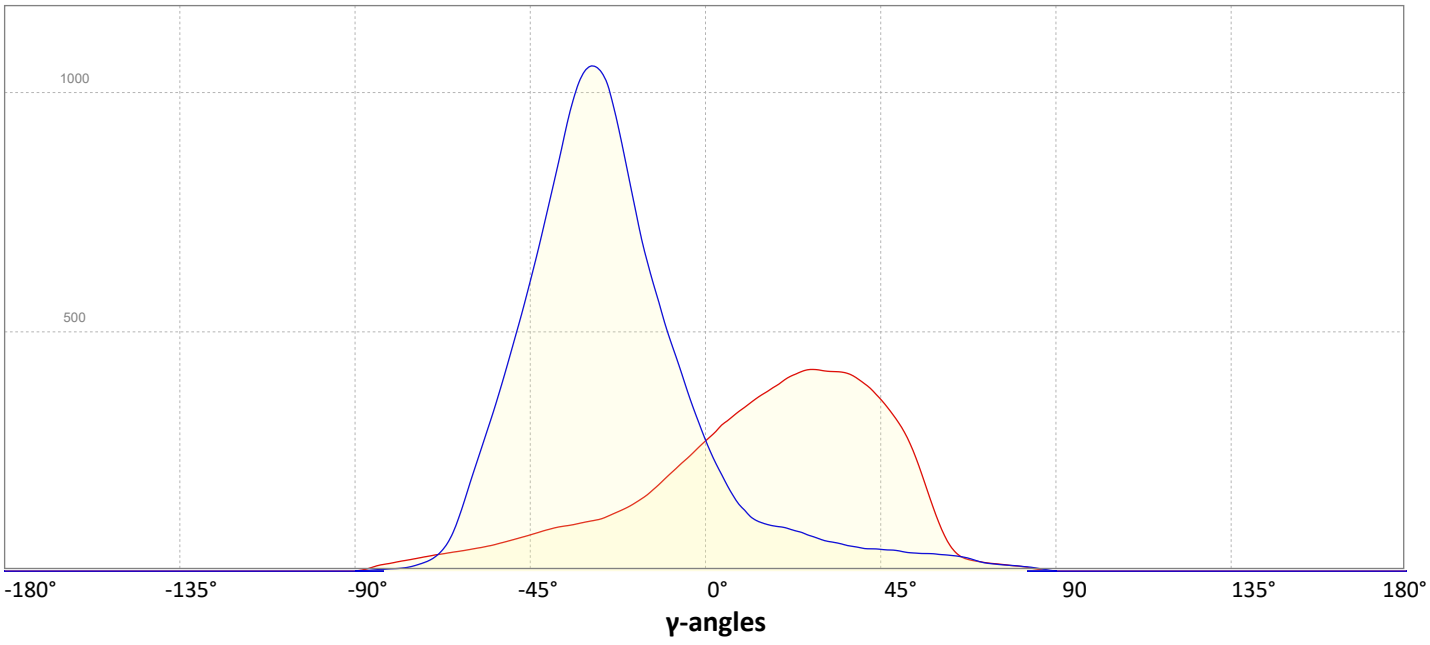
Average 10%	99.3°

Intensity Ratio

In 120° cone	92.0%
In 90° cone	66.5%

C000-C180
C090-C270

Linear distribution diagram - Intensity (candela) vs γ-angle



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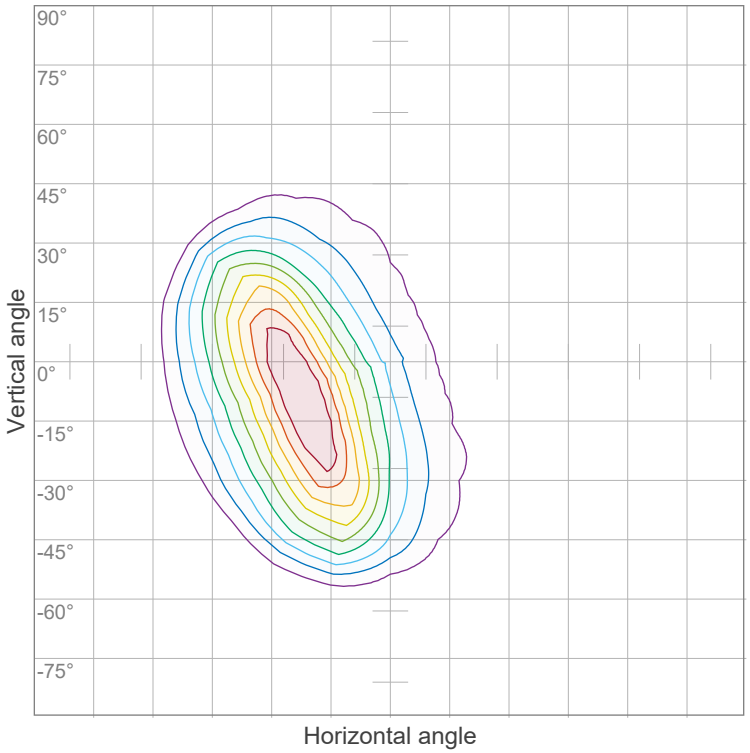
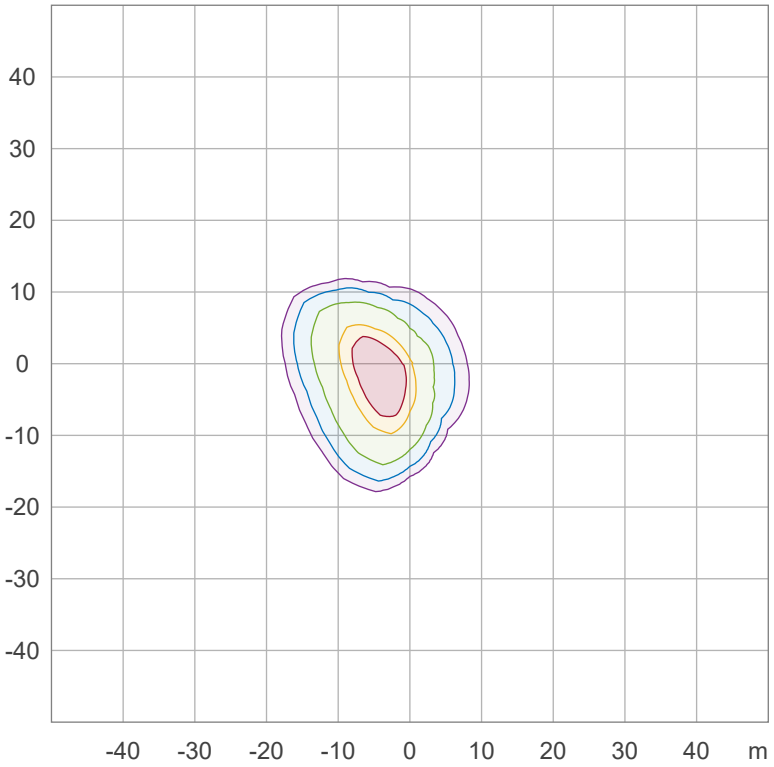
Iso-intensity Diagram (Iso-candela)



90 %	1113.5 cd
80 %	989.8 cd
70 %	866.1 cd
60 %	742.3 cd
50 %	618.6 cd
40 %	494.9 cd
30 %	371.2 cd
20 %	247.4 cd
10 %	123.7 cd

Peak intensity: 1237.2 cd
Number of c-planes: 24

Iso-illuminance Diagram (Iso-lux)



50.0 %	4.6 lx
30.0 %	2.8 lx
10.0 %	0.9 lx
5.0 %	0.5 lx
3.0 %	0.3 lx

Peak illuminance: 9.3 lx
Mounting height: 10.0 m
Number of c-planes: 24

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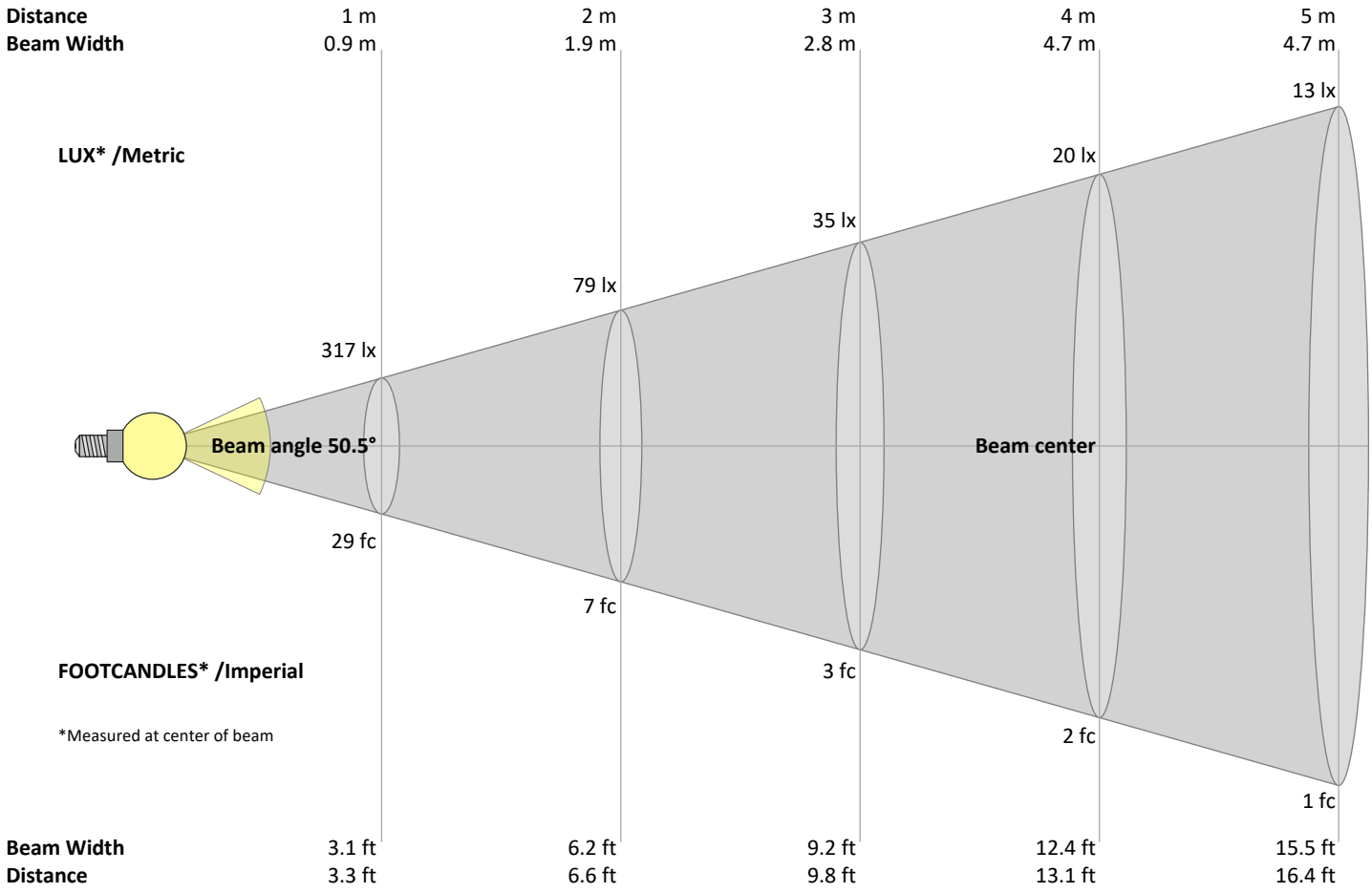
Beam Details



Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6	ft
317	79	35	20	13	9	6	5	4	3	3	2	2	2	1	1	1	1	1	1	lux
29.5	7.4	3.3	1.8	1.2	0.8	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
317	296	278	261	244	226	208	192	177	165	154	145	137	129	123	120	116	112	109	106	cd
100%	93%	88%	82%	77%	71%	66%	60%	56%	52%	49%	46%	43%	41%	39%	38%	37%	35%	34%	33%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
317	273	236	200	169	147	129	119	112	108	106	100	95	88	82	75	71	68	63	59	cd
100%	86%	74%	63%	53%	46%	41%	37%	35%	34%	33%	32%	30%	28%	26%	24%	22%	21%	20%	19%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
317	331	351	366	381	395	409	422	434	446	459	471	479	485	486	484	482	481	478	471	cd
100%	104%	110%	115%	120%	124%	129%	133%	137%	141%	145%	148%	151%	153%	153%	152%	152%	151%	151%	148%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
317	365	417	473	529	585	649	714	785	872	963	1054	1134	1190	1215	1214	1188	1136	1060	975	cd
100%	115%	131%	149%	167%	184%	204%	225%	247%	275%	303%	332%	357%	375%	383%	382%	374%	358%	334%	307%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances										
ρ Ceiling	70	70	50	50	30	70	70	50	50	30
ρ Walls	50	30	50	30	30	50	30	50	30	30
ρ Floor	20	20	20	20	20	20	20	20	20	20
Room size H = mounting height above eye level **X** **Y**	**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Variations with the observer position for the luminaire spacings, S:

n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

UGR data could not be calculated due to missing/wrong symmetry. Goto Edit->Photometric->Corrections and select Correct asymmetry.

Coefficients of Utilization

Ceiling reflectance		80			70			50			30			10			0	
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR	(RCR: Room Cavity Ratio)			Room Values are expressed as percentage of Lumen delivered to the task surface														
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	111	107	103	100	108	105	101	98	100	98	95	97	94	92	93	91	90	88
2	102	95	89	84	100	93	88	83	90	85	81	87	83	80	84	81	78	76
3	94	85	77	72	92	83	76	71	80	75	70	78	73	69	75	71	68	66
4	86	76	68	62	84	74	67	61	72	65	60	70	64	60	68	63	59	57
5	80	68	60	54	78	67	59	53	65	58	53	63	57	52	61	56	52	50
6	74	61	53	47	72	60	52	47	59	52	46	57	51	46	55	50	46	44
7	68	55	47	41	67	55	47	41	53	46	41	52	45	41	50	45	40	39
8	63	51	42	37	62	50	42	37	49	42	37	47	41	36	46	40	36	34
9	59	46	38	33	58	46	38	33	45	38	33	43	37	33	42	37	32	31
10	55	42	35	30	54	42	35	30	41	34	30	40	34	29	39	33	29	28

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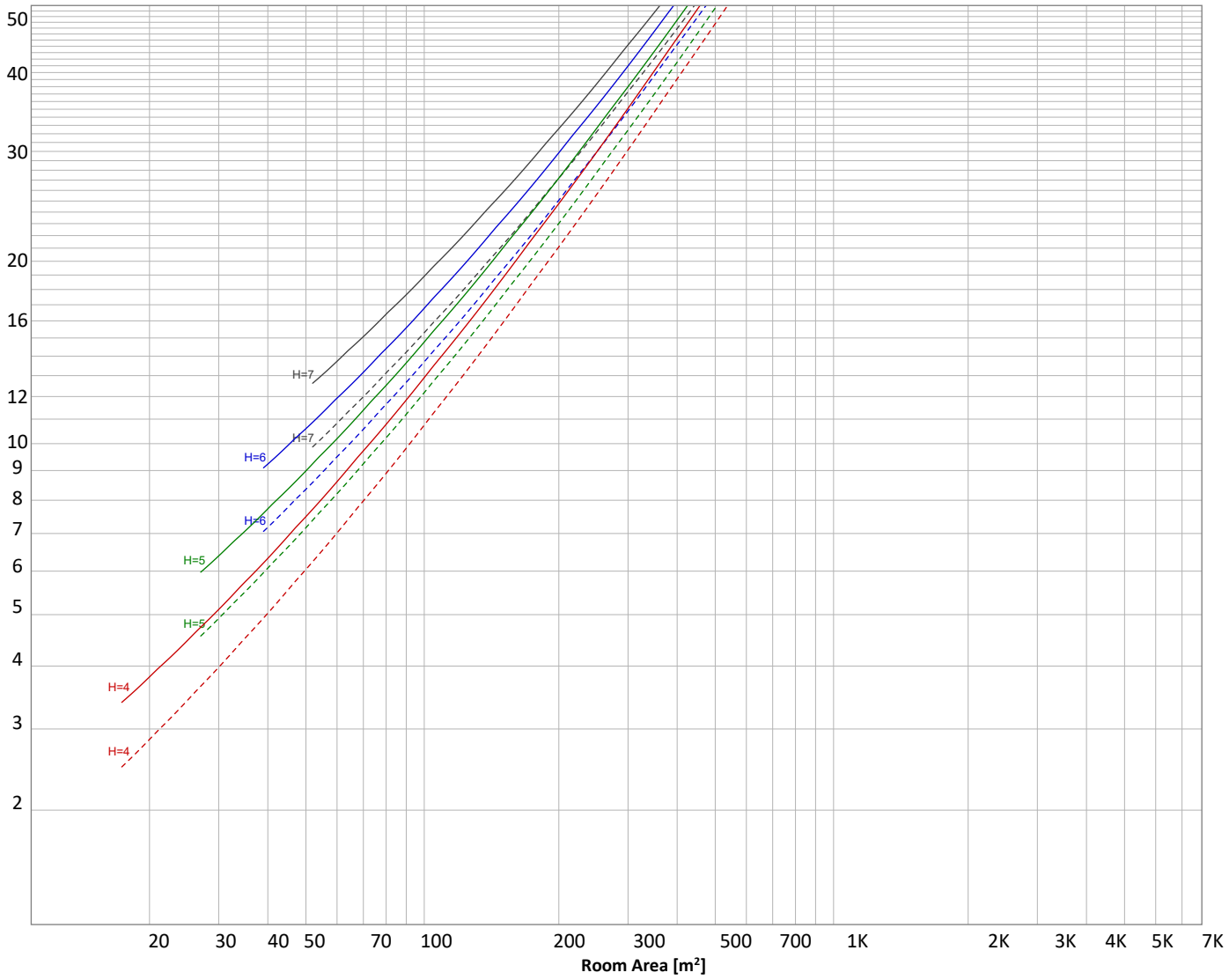
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1152 lm
H_{down} = Lamp distance from ceiling =	0.00 m
H_{work} = Work area height from floor =	0.00 m
E_{work} = Average lux on work area =	100 lx

	ρ(%)		
Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
----------	70	50	30
————	50	30	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
31.5 lm	107 lm	214 lm	279 lm	254 lm	174 lm	66.1 lm	19.9 lm	6.78 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.001 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm	0.000 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	31 lm	2.7%
10-20°	107 lm	9.3%
20-30°	214 lm	18.6%
30-40°	279 lm	24.2%
40-50°	254 lm	22.0%
50-60°	174 lm	15.1%
60-70°	66 lm	5.7%
70-80°	20 lm	1.7%
80-90°	7 lm	0.6%
90-100°	0 lm	0.0%
100-110°	0 lm	0.0%
110-120°	0 lm	0.0%
120-130°	0 lm	0.0%
130-140°	0 lm	0.0%
140-150°	0 lm	0.0%
150-160°	0 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	1152 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	352 lm	30.6%
0-40°	631 lm	54.8%
0-60°	1059 lm	92.0%
60-90°	93 lm	8.0%
70-100°	27 lm	2.3%
90-120°	0 lm	0.0%
0-90°	1152 lm	100.0%
90-180°	0 lm	0.0%
0-180°	1152 lm	100.0%

Intensity peaks

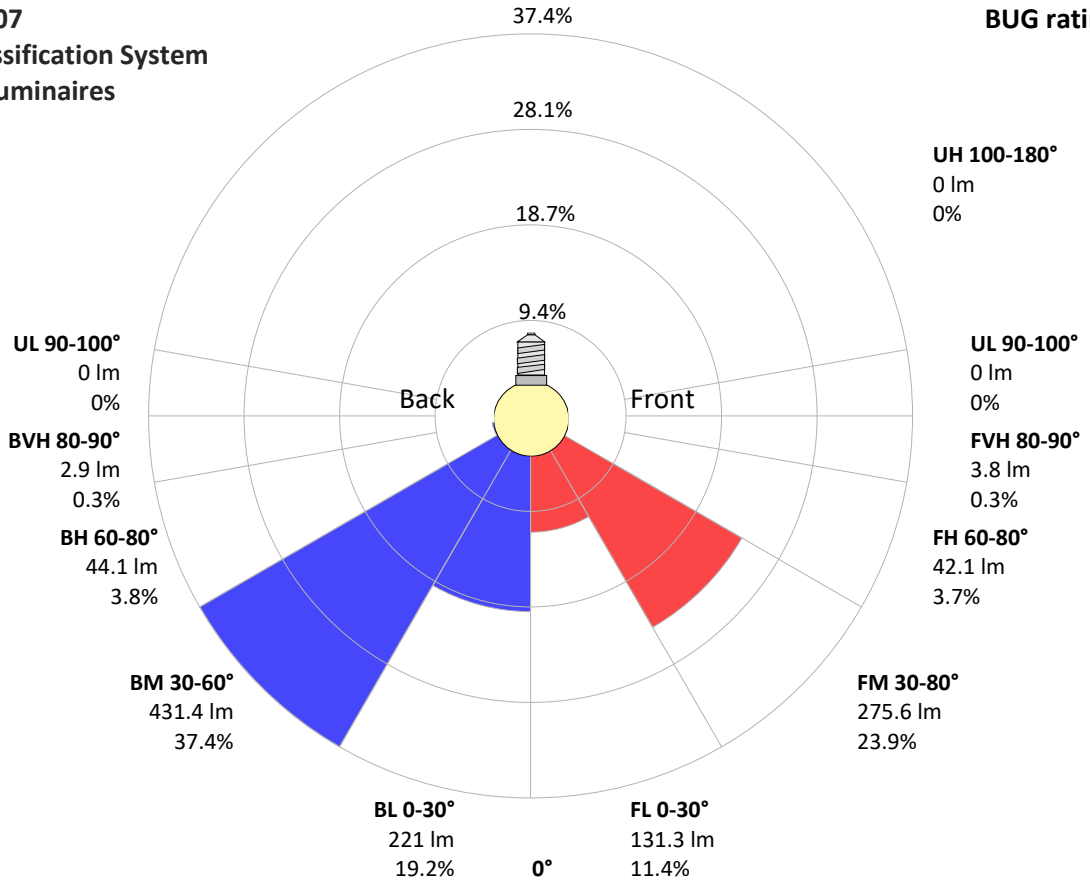
Max intensity	1240 cd
Intensity, 90°	0 cd
Intensity, 0°	317 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	131 lm	11.4%
Medium(30-60°)	276 lm	23.9%
High(60-80°)	42 lm	3.7%
Very high(80-90°)	4 lm	0.3%
Back light		
Low(0-30°)	221 lm	19.2%
Medium(30-60°)	431 lm	37.4%
High(60-80°)	44 lm	3.8%
Very high(80-90°)	3 lm	0.3%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

IESNA TM-15-07
Luminaire Classification System
For Outdoor Luminaires

BUG rating B1 U1 G0



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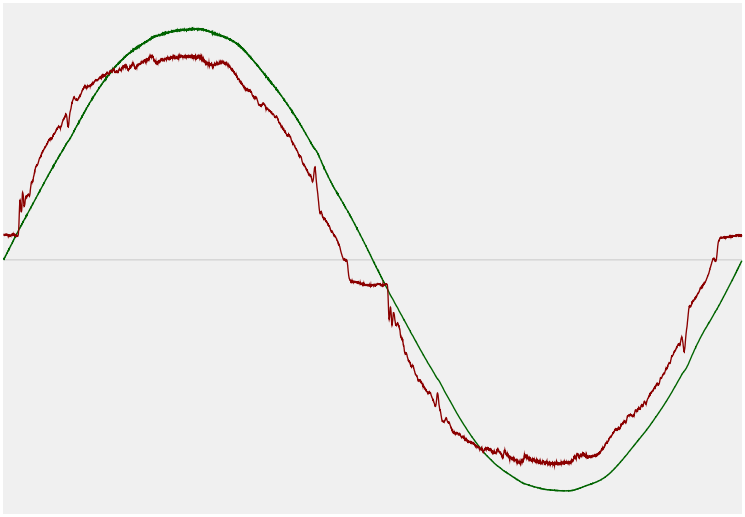
Power Details

Input Power

Power feed to light source	13.3 W
Frequency of input power	49.9 Hz
RMS Input voltage feed, V_{RMS}	239 V
RMS Input current feed, I_{RMS}	0.056 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	13.49 VA
Displacement factor of AC power feed	0.99
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.73%
Total harmonic distortion of the voltage	1.07%

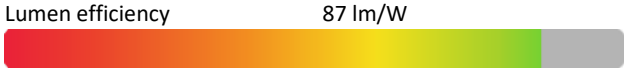
Input Power Curve



Efficiency

Radiated power efficiency 31.9%

Lumen efficiency 87 lm/W



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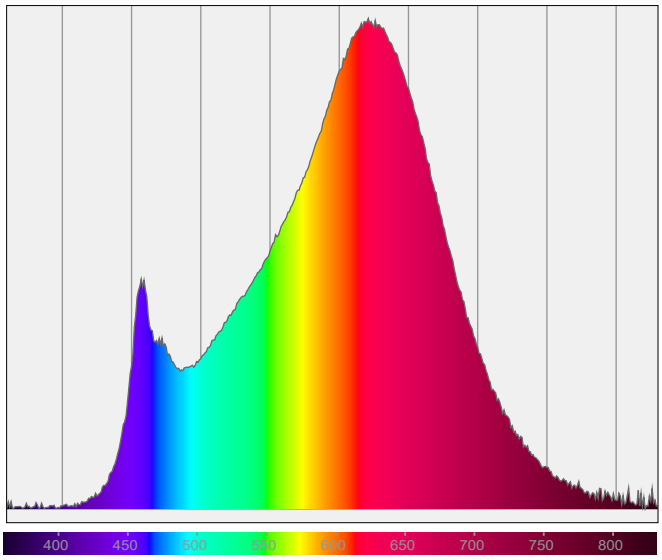
Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R_f 90.9 – R_g 98.6
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 2700 K	Color coordinates CIE 1931	(x;y) = (0.460;0.411)
Color Rendering Index	CRI 92.1	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 65.5	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R_f 90.9 – R_g 98.6	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 90.1		

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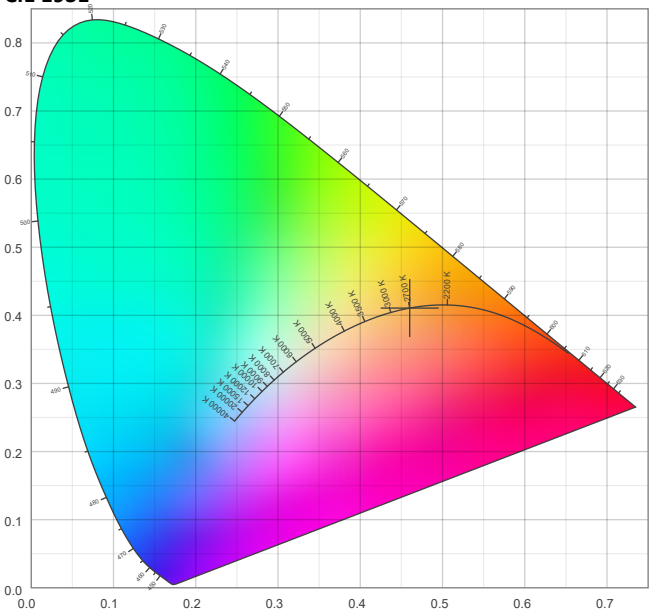
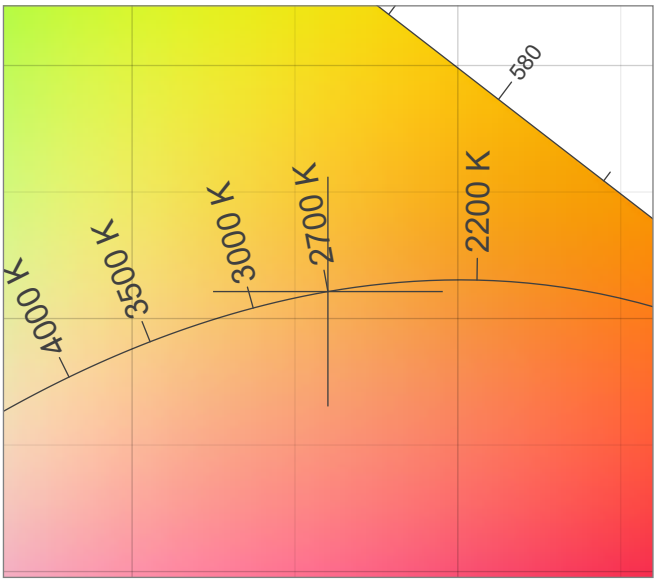
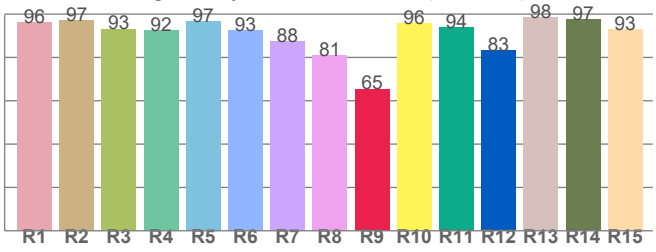
CIE 1931



CIE 1931 – zoomed on Planckian locus



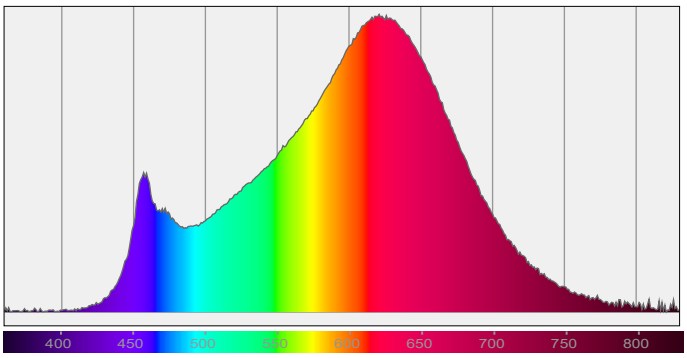
Color Rendering Index per reference color (CIE 1995)



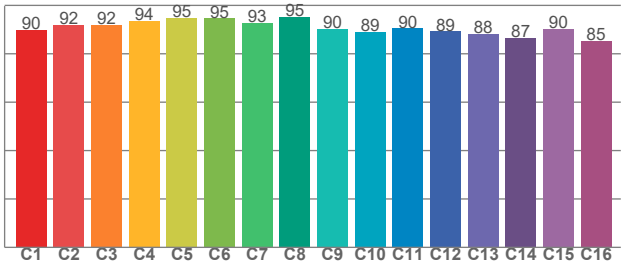
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
96.3	97.3	93.1	92.4	96.7	92.6	87.6	81.1	65.5	95.8	93.7	83.1	98.4	97.4	92.8

Spectral power distribution (SPD) / W/nm – 0-100%



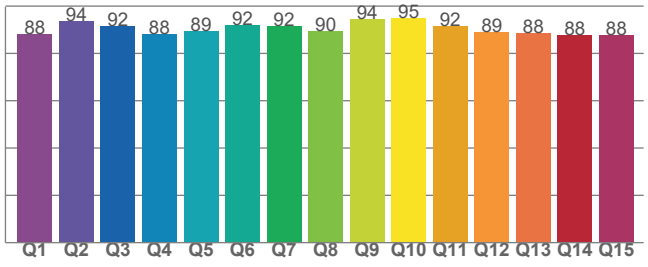
TM30-18 Rf-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
89.8	91.9	92.0	93.5	94.9	94.5	92.6	95.2	90.2	88.9	90.5	89.2	88.1	86.6	90.2	85.2

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.0	93.5	91.5	88.1	89.2	92.1	91.7	89.5	94.3	95.0	91.6	89.2	88.4	87.6	87.7